

# ETSI EN 301 489-1 V1.8.1 (2008-04)

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*Harmonized European Standard (Telecommunications series)*

## **Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements**

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**Reference**REN/ERM-EMC-246-1

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**Keywords**EMC, radio, regulation

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## Foreword

This Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [17] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (2004/108/EC [16] as amended) and Directive 1999/5/EC [15] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive").

Technical specifications relevant to the EMC Directive [16] and the R&TTE Directive [15] are given in annex A.

The present document is based upon the Generic Standards EN 61000-6-3 [18] and EN 61000-6-1 [19] and other standards, where appropriate, to meet the essential requirements of Council Directives 2004/108/EC [16], 1999/5/EC [15] and the motor vehicle EMC Directive 2004/104/EC [23] respectively.

The motor vehicle EMC Directive 2004/104/EC [23], is a type approval Directive, and contains in its annexes, all the technical requirements necessary to demonstrate conformance. There are two categories of after market equipment covered by the Directive as follows:

- a) After market (radio) equipment (and ancillary equipment) intended for installation in a motor vehicle, and which **are not related to immunity related functions** (annex I, clause 2.1.12 of the Directive) of the motor vehicle.
- b) After market (radio) equipment (and ancillary equipment) intended for installation in a motor vehicle, and which **are related to immunity related functions** (annex I, clause 2.1.12) of the motor vehicle, are subject to **type approval requirements** of the Directive 2004/104/EC [23].

The present document only deals with equipment of category a) subject to the requirements set out below.

**Annex I, clause 3.2.9 of 2004/104/EC [23]**, sets out the acceptance of conformity according to the procedures of 2004/108/EC [16] or 1999/5/EC [15] for after market equipment (ESAs) not related to immunity related functions of the motor vehicle (annex I, clause 2.1.12), but additionally requires that the ESA fulfils the limits defined in annex I, clauses 6.5, 6.6, 6.8, and 6.9 of the Directive. Requirements applicable to this type of after market equipment (ESAs) are set out in annex B of the present document.

The present document, and the product related parts of it are based on the current EMC standards published by ETSI. It should be noted that the majority of these EMC standards have also been published in the Official Journal of the European Commission.

The present document is part 1 of a multi-part EMC standard for radio equipment which is structured in the following way:

- One EMC standard for all radio equipment made up of several parts.
- All common technical requirements for EMC emission and immunity have been placed in the common part, which is the present document.
- Separate parts have been developed to cover specific product related radio equipment test conditions, test arrangements, performance assessment, performance criteria, etc.
- A clause is included in each of the specific radio parts, entitled "special conditions", which is used as appropriate to cover any deviations or additions to the common requirements set out in the present document.

To demonstrate an adequate level of EMC protection, the present document is to be used together with the appropriate specific radio part of the standard.

The present document is part 1 of a multi-part deliverable covering ElectroMagnetic Compatibility (EMC) standard for radio equipment and services, as identified below:

**Part 1: "Common technical requirements";**

Part 2: "Specific conditions for radio paging equipment";

Part 3: "Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz";

Part 4: "Specific conditions for fixed radio links and ancillary equipment and services";

Part 5: "Specific conditions for Private land Mobile Radio (PMR) and ancillary equipment (speech and non-speech)";

Part 6: "Specific conditions for Digital Enhanced Cordless Telecommunications (DECT) equipment";

Part 7: "Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS)";

Part 8: "Specific conditions for GSM base stations";

Part 9: "Specific conditions for wireless microphones, similar Radio Frequency (RF) audio link equipment, cordless audio and in-ear monitoring devices";

Part 10: "Specific conditions for First (CT1 and CT1+) and Second Generation Cordless Telephone (CT2) equipment";

Part 11: "Specific conditions for terrestrial sound broadcasting service transmitters";

Part 12: "Specific conditions for Very Small Aperture Terminal, Satellite Interactive Earth Stations operated in the frequency ranges between 4 GHz and 30 GHz in the Fixed Satellite Service (FSS)";

Part 13: "Specific conditions for Citizens' Band (CB) radio and ancillary equipment (speech and non-speech)";

Part 14: "Specific conditions for analogue and digital terrestrial TV broadcasting service transmitters";

Part 15: "Specific conditions for commercially available amateur radio equipment";

Part 16: "Specific conditions for analogue cellular radio communications equipment, mobile and portable";

Part 17: "Specific conditions for 2,4 GHz wideband transmission systems, 5 GHz high performance RLAN equipment and 5,8 GHz Broadband Data Transmitting Systems";

Part 18: "Specific conditions for Terrestrial Trunked Radio (TETRA) equipment";

Part 19: "Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications";

Part 20: "Specific conditions for Mobile Earth Stations (MES) used in the Mobile Satellite Services (MSS)";

- Part 22: "Specific conditions for ground based VHF aeronautical mobile and fixed radio equipment";
- Part 23: "Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) Base Station (BS) radio, repeater and ancillary equipment";
- Part 24: "Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment";
- Part 25: "Specific conditions for CDMA 1x spread spectrum Mobile Stations and ancillary equipment";
- Part 26: "Specific conditions for CDMA 1x spread spectrum Base Stations, repeaters and ancillary equipment";
- Part 27: "Specific conditions for Ultra Low Power Active Medical Implants (ULP-AMI) and related peripheral devices (ULP-AMI-P)";
- Part 28: "Specific conditions for wireless digital video links";
- Part 31: "Specific conditions for equipment in the 9 kHz to 315 kHz band for Ultra Low Power Active Medical Implants (ULP-AMI) and related peripheral devices (ULP-AMI-P)";
- Part 32: "Specific conditions for Ground and Wall Probing Radar applications".

### National transposition dates

Date of adoption of this EN:	4 April 2008
Date of latest announcement of this EN (doa):	31 July 2008
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2009
Date of withdrawal of any conflicting National Standard (dow):	31 January 2010



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# 1 Scope

The present document contains the common requirements for radio communications equipment and associated ancillary equipment, in respect of ElectroMagnetic Compatibility (EMC).

Product dependent arrangements necessary to perform the EMC tests on dedicated types of radio communications equipment, and the assessment of test results, are detailed in the appropriate product related parts of EN 301 489 series [11].

The present document, together with the product related part, specifies the applicable EMC tests, the methods of measurement, the limits and the performance criteria for radio equipment and associated ancillary equipment. In case of differences (for instance concerning special conditions, definitions, abbreviation) between part 1 of the present document and the relevant product related part of EN 301 489 series [11], the product related part takes precedence.

Technical specifications related to the antenna port of radio equipment and radiated emissions from the enclosure port of radio equipment and combinations of radio and associated ancillary equipment are not included in the present document. Such technical specifications are normally found in the relevant product standards for the effective use of the radio spectrum.

The environment classification used in the present document refers to the environment classification used in:

- EN 61000-6-3 [18] and EN 61000-6-1 [19] for the residential, commercial and light industrial environment; or
- TR 101 651 [20] for the telecommunication centre environment; or
- ISO 7637-2 [8] for the vehicular environment.

The EMC requirements have been selected to ensure an adequate level of compatibility for apparatus intended to be used in the environments mentioned above. The levels, however, do not cover extreme cases which may occur in any location but with low probability of occurrence. The applicable environment(s) shall be declared by the manufacturer and shall be in accordance with the equipment documentation.

For radio equipment and associated ancillary equipment intended to be installed in motor vehicles (i.e. ESAs) and not related to immunity related functions of the vehicle, additional technical requirements necessary to demonstrate conformance to the motor vehicle EMC Directive 2004/104/EC [23], are set out in annex B (normative) of the present document.

The present document may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena or a continuous phenomenon is permanently present, e.g. a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference or the interfered part or both.

Where none of the existing specific product related radio parts covers the required conditions for a particular radio equipment/service e.g. in case of the initial introduction of a new radio service or a special application, the present document can be used together with specific information for the radio equipment provided by the manufacturer, for the purposes of testing to the EMC requirements set out in the present document.

In all cases where a radio product falls within the scope of a specific product related radio part of the standard, the product related part takes precedence.

Compliance of radio equipment to the requirements of the present document does not signify compliance to any requirements related to spectrum management or to the use of the equipment (licensing requirements).

Compliance to the requirements of the present document does not signify compliance to any safety requirements. However, it is the responsibility of the assessor of the equipment to record in the test report any observations regarding the test sample becoming dangerous or unsafe as a result of the application of the tests called for in the present document.

NOTE: Radio equipment for use in maritime environment is covered by other ETSI EMC standards.

## 2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
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  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
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NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

### 2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] CENELEC EN 55022 (2006): "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement".
- [2] CENELEC EN 61000-4-2 (2001): "Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test".
- [3] CENELEC EN 61000-4-3 (2006): "Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test".
- [4] CENELEC EN 61000-4-4 (2004): "Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test".
- [5] CENELEC EN 61000-4-5 (2006): "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test".
- [6] CENELEC EN 61000-4-6 (2005): "Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields".
- [7] CENELEC EN 61000-4-11 (2004): "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests".
- [8] ISO 7637-2 (2004): "Road vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only".
- [9] CENELEC EN 61000-3-3 (1995): "Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connection".

- [10] CISPR 25 (2nd Edition 2002): "Radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on devices - Limits and methods of measurement".
- [11] ETSI EN 301 489 series: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".
- [12] CENELEC EN 61000-3-12 (2005): "Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current  $> 16$  A and  $\leq 75$  A per phase".
- [13] CENELEC EN 61000-3-11 (2000): "Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current  $\leq 75$  A and subject to conditional connection".
- [14] CENELEC EN 55016-2-3 (2006) "Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurements of disturbances and immunity - Radiated disturbance measurements".

## 2.2 Informative references

- [15] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [16] Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC (EMC Directive).
- [17] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.
- [18] CENELEC EN 61000-6-3 (2001): "Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments".
- [19] CENELEC EN 61000-6-1 (2007): "Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments".
- [20] ETSI TR 101 651 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Classification of the electromagnetic environment conditions for equipment in telecommunication networks".
- [21] CENELEC EN 61000-3-2/Amendment 1 (2006): "Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)".
- [22] IEC 60050-161: "International Electrotechnical Vocabulary. Chapter 161: Electromagnetic compatibility".
- [23] Commission Directive 2004/104/EC of 14 October 2004 adapting to technical progress Council Directive 72/245/EEC relating to the radio interference (electromagnetic compatibility) of vehicles and amending Directive 70/156/EEC on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers.
- [24] CENELEC EN 55016-1-4 (2004): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances".
- [25] ITU-R Radio Regulations (2004).
- [26] ETSI EN 301 843-1 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 1: Common technical requirements".

- [27] IEEE 1284-2000: "IEEE Standard Signaling Method for a Bidirectional Parallel Peripheral Interface for Personal Computers".
- [28] IEEE 1394.1-2004: "IEEE Standard for High Performance Serial Bus Bridges".

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**ancillary equipment:** equipment (apparatus), used in connection with a receiver or transmitter

NOTE: It is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a receiver or transmitter to provide additional operational and/or control features to the radio equipment, (e.g. to extend control to another position or location); and
- the equipment cannot be used on a stand alone basis to provide user functions independently of a receiver or transmitter; and
- the receiver or transmitter, to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

**base station equipment:** radio and/or ancillary equipment intended for operation at a fixed location and powered directly or indirectly (e.g. via an AC/DC converter or power supply) by the AC mains network, or an extended local DC mains network

**combined equipment:** any equipment made of two or more individual products or functions

NOTE: At least one of the individual products or functions falls within the scope of the R&TTE Directive [15] and contains a radio transmitting function. The result of this combination provides additional control and/or functionality to the combined equipment.

**continuous phenomena (continuous disturbance):** electromagnetic disturbance, the effects of which on a particular device or equipment cannot be resolved into a succession of distinct effects

NOTE: See IEC 60050-161 [22].

**enclosure port:** physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

NOTE: In the case of integral antenna equipment, this port is inseparable from the antenna port.

**Electrical/Electronic Sub-Assembly (ESA):** electrical and/or electronic device or set(s) of devices intended to be part of a vehicle, together with any associated electrical connections and wiring, which performs one or more specialized functions

**host equipment:** any equipment which has a complete user functionality when not connected to a radio communications equipment, and to which this radio equipment provides additional functionality, and to which connection is necessary for this radio equipment to offer additional functionality, and in which the transceiver part of the radio equipment is physically installed

NOTE: This also covers any device that would accept a variety of radio modules, where the original user functionality of the host equipment is not affected.

**integral antenna:** antenna which may not be removed during the tests, according to the manufacturer's statement

**manufacturer:** manufacturer of the equipment, or his authorized representative, or an equipment supplier to the European market